UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

January 3, 2003

Thomas F. Mueller
Chief, Regulatory Branch
Department of the Army
Seattle District Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation for the Port of Clarkson Gateway Boat Dock Expansion Project, Asotin County, WA (NOAA Fisheries No. 2002/00995).

Dear Mr. Mueller:

The attached document transmits the National Marine Fisheries Service (National Oceanic and Atmospheric Administration (NOAA Fisheries)) Biological Opinion (Opinion) on the proposed Port of Clarkson Gateway Boat Expansion Project in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531).

The U.S. Army Corps of Engineers (COE) has determined that the proposed action was not likely to adversely affect Snake River (SR) fall chinook (*O. tshawytscha*) , SR spring/summer-run chinook (*O. tshawytscha*), SR Basin steelhead (*O. mykiss*), and SR sockeye salmon (*O. nerka*) Evolutionary Significant Units. NOAA Fisheries did not concur with the initial effect determination. Formal consultation was initiated on November 21, 2002.

This Opinion reflects the results of formal consultation including an analysis of effects covering the named listed species in the Snake River, above Lower Granite Dam in Washington State. The Opinion is based on information provided in the biological assessment received by NOAA Fisheries on August 16, 2002, and subsequent information transmitted by telephone conversations and electronic mail. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of the above listed species or result in the destruction or adverse modification of their critical habitat. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take. If you have any questions, please contact Justin Yeager of the Washington Habitat Branch Office at (509) 925-2618.

Sincerely,

Russell M Strach for

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation

Biological Opinion

And

Magnuson-Stevens Fishery Conservation and Management Act

Essential Fish Habitat Consultation

Port of Clarkston Gateway Boat Dock Extension, Asotin County, WA
NOAA Fisheries No. 2002/00995

Action Agency: U.S. Army Corps of Engineers

Consultation Conducted by: National Marine Fisheries Service, Northwest Region, Washington Habitat Branch

Issued by: Russell M Strach for

D. Robert Lohn
Regional Administrator

Date Issued: January 3, 2003

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1.0 INTRODUCTION

This document is the product of an Endangered Species Act (ESA) section 7 formal consultation and Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) consultation between the National Marine Fisheries Service (National Oceanic and Atmospheric Administration [NOAA Fisheries]) and the Army Corps of Engineers (COE) on a proposed extension of the Port of Clarkston Gateway Dock on the Snake River in the City of Clarkston, Asotin County, Washington. The proposed action will occur within the geographic boundaries and habitats of several Evolutionarily Significant Units (ESU[1]) and the ESA listed salmon and steelhead therein, including endangered Snake River (SR) sockeye (*Oncorhynchus nerka*), threatened Snake River fall (SRF) chinook (*O. tshawytscha*), threatened Snake River spring/summer (SRSS) chinook (*O. tshawytscha*), and threatened Snake River Basin (SRB) steelhead (*O. mykiss*). Additionally, the proposed Action Area is designated as Essential Fish Habitat (EFH) for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon.

The purpose of this document is to present NOAA Fisheries' opinion on whether the proposed action is likely to jeopardize the continued existence of the SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead ESUs listed under the ESA, or result in the destruction or adverse modification of their designated Critical Habitat (excluding SR steelhead; see footnote 2). Further, this document will determine if the proposed action will adversely affect designated coho and chinook salmon EFH. These ESA and EFH determinations will be reached by analyzing the biological effects of construction activities related to extending the dock, driving steel pilings, and retrofitting ramps, relating those effects to the biological and ecological needs of listed species, and then adding these effects to the environmental baseline of the Action Area.

1.1 Background Information

The Port of Clarkston Gateway Dock, located at river mile 138.7 on the south shore of the Snake River, was constructed in 1991. The dock serves as a mooring location for commercial boats and is currently too short in length to accommodate demand. The Port of Clarkston is the proponent of the action that is the subject of this consultation. Permits will be provided by COE, thus creating a Federal nexus and the need for section 7 consultation. Further description of this project is provided in Section 1.3 below.

1.2 Consultation History

On August 16, 2002, NOAA Fisheries received a request from the COE for ESA section 7 informal consultation and Essential Fish Habitat (EFH) consultation to permit an extension of the Port of Clarkston Gateway Boat Dock. Based on the potential for take of ESA-listed salmonids, NOAA Fisheries did not concur with the COE's "not likely to adversely affect" (NLAA) determination. In addition, NOAA Fisheries did not concur with the COE's determination of will not adversely affect for EFH. Formal consultation was initiated on

[1]"ESU" means a population or group of populations that is considered distinct (and hence a "species") for purposes of conservation under the ESA. To qualify as an ESU, a population must (1) be reproductively isolated from other conspecific populations, and (2) represent an important component in the evolutionary legacy of the biological species (Waples 1991).

November 21, 2002.

This combined ESA and EFH consultation is based on the information presented in the Biological Assessment (BA) and EFH assessment received August 16, 2002, the addendum to the BA received on October 16, 2002, phone conversations, and electronic mail correspondence.

1.3 Description of the Proposed Action

The COE proposes to issue a permit to the Port of Clarkston for the extension of the Gateway Boat Dock. The projects included are: adding 100 additional feet to an existing 454-foot long boat dock, driving four new triple-piles and 23 batter piles, and replacing two wooden ramps with grated ramps. The purpose of the project is to increase dock capacity to accommodate projected demands. The project is located along the Snake River at river mile 138.7 in the City of Clarkston, Washington, Township 11 North, Range 46 East.

The proposed action would add 100 feet to an existing 454-foot long boat dock, consisting of two, 8 by 25 foot (200 square feet each) floats at each end of the existing dock, for a total of four new floats. Each 8 byx25 foot section would be partially grated with a two foot by eight foot (16 square feet) section running down the center. Each dock section will be secured to a triple-pile arrangement consisting of one plumb pile and two batter piles. The 16-inch plumb piles and 14-inch batter piles will be driven from a barge with a vibratory hammer into the streambed until refusal. The barge will also be used to transport all construction material to the project area. In addition, there are two 6 foot by 40 foot (240 square feet) ramps that connect the dock to the shore. These will be reconstructed with metal grating rated at greater than 60% open space. Construction activities will be conducted between December 15, 2002 and March 1, 2003. The incorporation of grating and the minimization of pile size was implemented to reduce the effects of in- and over- water structures on listed fish and their critical habitat.

1.4 Description of the Action Area

Under the ESA, the "Action Area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 C.F.R. 402.02). For the purposes of this consultation the Action Area includes Lower Granite Lake/Lower Granite Dam reservoir. Although most effects of the action will be localized, increases in predator population and boating activity have the potential to affect listed salmonids throughout the reservoir.

2.0 ENDANGERED SPECIES ACT

2.1 Biological Opinion

The objective of this Biological Opinion (Opinion) is to determine whether the proposed project is likely to jeopardize the continued existence of the SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead ESUs, or result in the destruction or adverse modification of their designated Critical Habitat (excluding SRB steelhead).

2.1.1 Status of Species and Critical Habitat

The listing status, biological information, and Critical Habitat elements or potential Critical Habitat for NOAA Fisheries listed species that are the subject of this consultation are described below in Table 1. Most of the information listed in the following table is available for download at http://www.nwr.noaa.gov/1salmon/salmesa/index.htm.

Species	Listing Status Reference	Critical Habitat Reference	Biological Information
Snake River (SR) sockeye *(O. nerka)*	Endangered Species, (56 Fed. Reg. 58619, November 20, 1991)	Designated Critical Habitat, (58 Fed. Reg. 68543, December 28, 1993)	Status Review for Snake River Sockeye Salmon (Waples and Johnson 1991)
Snake River fall (SRF) chinook (*O. tshawytscha*)	Threatened Species, (57 Fed. Reg. 14653, April 22, 1992). See correction: (57 Fed. Reg. 23458, June 3, 1992)	Designated Critical Habitat, (58 Fed. Reg. 68543, December 28, 1993)	Status Review for Snake River Fall Chinook Salmon (Waples *et al.* 1991)
Snake River spring/summer (SRSS) chinook (*O. tshawytscha*)	Threatened Species, (57 Fed. Reg. 14653, April 22, 1992). See correction:(57 Fed. Reg. 23458, June 3 1992)	Designated Critical Habitat, (58 Fed. Reg. 68543, December 28, 1993). See update: (64 Fed. Reg. 57399, October 25, 1999)	Status Review for Snake River Spring and Summer Run Chinook Salmon (Matthews and Waples 1991)

Snake River Basin (SRB) steelhead (*O. mykiss*)	Threatened Species, August 18, 1997 (62 Fed. Reg. 43937, August 18, 1997)	Not Designated[2]	Status Review of West Coast Steelhead from Washington, Idaho, Oregon and California, (Busby *et al.*, 1996)

Table 1. References to Federal Register Notices containing additional information concerning listing status, biological information, and Critical Habitat designations for listed and proposed species considered in this Opinion.

The proposed action will occur within the designated Critical Habitat of endangered SR sockeye, threatened SRF chinook, and threatened SRSS chinook salmon. Essential features of this Critical Habitat include substrate (especially spawning gravels), water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (58 Fed. Reg. 68543, December 28, 1993).

Throughout the Columbia and Snake River Basins, salmonids have been negatively affected by a combination of habitat alteration and hatchery management practices. Mainstem dams on the Snake River, as well as downstream facilities on the Columbia River, are perhaps the most significant source of habitat degradation in the ESUs addressed under this consultation. The dams act as a partial barrier to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition to dams, irrigation systems have had a major negative impact by diverting large quantities of water, stranding fish, acting as barriers to passage, and returning effluents containing chemicals and fine sediments. Other major habitat degradation has occurred through urbanization and livestock grazing practices (WDFW *et al.* 1993; Busby *et al.* 1996; NMFS 1996a; 1998; 2000; 57 Fed. Reg. 14653, April 22, 1992; 62 Fed. Reg. 43937, August 18, 1997).

Habitat alterations and differential habitat availability (*e.g.*, fluctuating discharge levels) impose an upper limit on the production of naturally spawning populations of salmon and steelhead. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and large woody debris (NMFS 1996a; 1998; NRCC 1996; Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of these ESUs. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation

[2]Under development. On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing a February 2000 Critical Habitat designation for this and 18 other ESUs.

or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; Hilborn 1992; NMFS 1996a; 63 Fed. Reg. 11798, March 10, 1998).

The following information summarizes the status of Snake River salmonids by ESU that are the subjects of this consultation. Most of this narrative was largely taken from the Opinion on Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin (FCRPS; NMFS 2000).

2.1.1.1 Snake River Sockeye

The SR sockeye salmon ESU, listed as endangered on November 20, 1991 (56 Fed. Reg. 58619), includes populations of sockeye salmon from the Snake River Basin, Idaho (extant populations occur only in the Salmon River subbasin). Under NOAA Fisheries' interim policy on artificial propagation (58 Fed. Reg. 17573; April 5, 1993), the progeny of fish from a listed population that are propagated artificially are considered part of the listed species and are protected under the ESA. Thus, although not specifically designated in the 1991 listing, SR sockeye salmon produced in the captive broodstock program are included in the listed ESU. Given the dire status of the wild population under any criteria (16 wild and 264 hatchery-produced adult sockeye returned to the Stanley Basin between 1990 and 2000), NOAA Fisheries considers the captive broodstock and its progeny essential for recovery. Critical Habitat was designated for SR sockeye salmon on December 28, 1993 (58 Fed. Reg. 68543).

Snake River sockeye were historically abundant in several lake systems of Idaho and Oregon. However, all populations have been extirpated in the past century; the only remaining sockeye in the Snake River system are found in Redfish Lake, in the Stanley Basin on the Salmon River. The nonanadromous form (kokanee), found in Redfish Lake and elsewhere in the Snake River Basin, is included in the ESU. SR sockeye occur within the Action Area only during their smolt and adult migrations.

2.1.1.2 Snake River Fall Chinook

The SRF chinook salmon ESU, listed as threatened on April 22, 1992 (57 Fed. Reg. 14653), includes all natural-origin populations of fall chinook in the mainstem Snake River and its tributaries. Fall chinook from the Lyons Ferry Hatchery are included in the ESU but are not listed. Critical Habitat was designated for SRF chinook salmon on December 28, 1993 (58 Fed. Reg. 68543).

The Snake River Basin drains an area of approximately 280,000 square kilometers and incorporates a range of vegetative life zones, climatic regions, and geological formations, including the deepest canyon (Hells Canyon) in North America. The location, geology, and climate of the Snake River region create a unique aquatic ecosystem for chinook salmon. The ESU includes the mainstem river and all tributaries (*e.g.*, Tucannon, Grande Ronde, Clearwater, and Salmon Rivers), from their confluence with the Columbia River to the Hells Canyon complex. Because genetic analyses indicate that fall-run chinook salmon in the Snake River are distinct from the spring/summer-run in the Snake Basin (Waples *et al.* 1991), SRF chinook salmon are considered separately from the other two forms. They are also considered separately from those assigned to the Upper Columbia River summer- and fall-run ESU because of considerable differences in habitat characteristics and adult ocean distribution, and less definitive, but still significant, genetic differences.

SRF chinook salmon remained stable at high levels of abundance through the first part of the twentieth century, but then declined substantially. Although the historical abundance of fall chinook salmon in the Snake River is difficult to estimate, adult returns appear to have declined by three orders of magnitude since the 1940s, and perhaps by another order of magnitude from pristine levels. Irving and Bjornn (1981) estimated that the mean number of fall chinook salmon returning to the Snake River declined from 72,000 during the period 1938 to 1949 to 29,000 during the 1950s. Further declines occurred upon completion of the Hells Canyon complex, which blocked access to primary salmonid production areas in the late 1950s (see section 2.1.2.2.2).

It is possible that a few SRF chinook may utilize the Action Area as spawning habitat, but the majority of adults moving through the reach are destined for upriver spawning sites. Therefore, SRF chinook are most reliant on the Action Area for rearing and emigration. Anecdotal evidence suggests that some SRF chinook exhibit a stream type life history and might be in the Action Area during construction activities.

2.1.1.3 Snake River Spring/Summer Chinook

The SRSS chinook salmon ESU, listed as threatened on April 22, 1992 (57 Fed. Reg. 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon rivers. Some or all of the fish returning to several of the hatchery programs are also listed including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical Habitat was designated for SRSS chinook salmon on December 28, 1993 (58 Fed. Reg. 68543), and was revised on October 25, 1999 (64 Fed. Reg. 57399).

Spring- and/or summer-run chinook salmon are found in several subbasins of the Snake River (CBFWA 1990). Of these, the Grande Ronde and Salmon rivers are large, complex systems composed of several smaller tributaries that are further composed of many small streams. In contrast, the Tucannon and Imnaha rivers are small systems with most salmon production in the main river. In addition to these major subbasins, three small streams (Asotin, Granite, and Sheep creeks) that enter the Snake River between Lower Granite and Hells Canyon Dam provide small spawning and rearing areas (CBFWA 1990). Although there are some indications that multiple ESUs may exist within the Snake River Basin, the available data do not clearly demonstrate their existence or define their boundaries. Because of compelling genetic and life-history evidence that fall chinook salmon are distinct from other chinook salmon in the Snake River, however, they are considered a separate ESU.

Historically, spring and/or summer chinook salmon spawned in virtually all accessible and suitable habitat in the Snake River system (Evermann 1895; Fulton 1968). During the late 1800s, the Snake River produced a substantial fraction of all Columbia River Basin spring and summer chinook salmon, with total production probably exceeding 1.5 million in some years. By the mid-1900s, the abundance of adult spring and summer chinook salmon had greatly declined. Fulton (1968) estimated that an average of 125,000 adults per year entered the Snake River tributaries from 1950 through 1960. As evidenced by adult counts at dams, however, spring and summer chinook salmon have declined considerably since the 1960s (COE 1989).

SRSS chinook are not thought to rear in the impounded portions of the Snake River. They do, however, pass through the Action Area on their adult and smolt migrations.

2.1.1.4 Snake River Basin Steelhead

The SRB steelhead ESU, listed as threatened on August 18, 1997 (62 Fed. Reg. 43937), includes all natural-origin populations of steelhead in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River Basin are listed, but several are included in the ESU. Critical Habitat is not presently designated for SR steelhead, although a re-designation is likely forthcoming (see footnote 2).

Steelhead spawning habitat in the Snake River Basin is distinctive in having large areas of open, low-relief streams at high elevations. In many Snake River tributaries, spawning occurs at a higher elevation (up to 2,000 meters) than for steelhead in any other geographic region. Also, SRB steelhead also migrate farther from the ocean (up to 1,500 kilometers) than most.

SRB steelhead are not known to spawn or rear in the impounded reaches of the Snake River. However, adult SRB steelhead are known to hold in the mainstem Snake River for extended periods (months) prior to spawning, and thus are likely to be in the Action Area during the proposed work window.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA and 50 C.F.R. Part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify Critical Habitat (where designated). This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

From that, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of injury or mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the Action Area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

Furthermore, NOAA Fisheries evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' designated Critical Habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of Critical Habitat for both survival and recovery of the listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential element of Critical Habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify Critical Habitat it must identify any reasonable and prudent alternatives available.

Guidance for making determinations on the issue of jeopardy and adverse modification of habitat are contained in *The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, August 1999 (available online at: www.nwr.noaa.gov/1habcon/habweb/pubs/newjeop9.pdf).

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' Critical Habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration and spawning of the listed salmon under the existing environmental baseline.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying ESA Section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species; taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its original decision to list the species for protection under the ESA. Additionally, the assessment will consider any new information or data that are relevant to the determination (see Table 1 for references).

The relevant biological requirements are those necessary for salmon in each ESU to survive and recover to naturally reproducing population levels, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead share similar basic biological requirements. These requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al.* 1996). Even slight modifications of these habitat elements can produce deleterious effects to these listed salmonids and their Critical Habitat (in the case of SR sockeye, SRF chinook, and SRSS chinook).

Based on the best available information, NOAA Fisheries concludes that not all of the biological requirements of SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead are being met under the environmental baseline. The specific biological requirements affected by the proposed action include water quality, food, and unimpeded migratory access.

NOAA Fisheries has related the biological requirements for listed salmonids to a number of habitat attributes, or pathways, in the Matrix of Pathways and Indicators ((MPI); available online at: www.nwr.noaa.gov/1habcon/habweb/pubs/matrix.pdf; NMFS 1996b). These pathways (Water Quality, Habitat Access, Habitat Elements, Channel Condition and Dynamics, Flow/Hydrology, and Watershed Conditions) indirectly measure the baseline biological health of listed salmon populations through the health of their habitat. Specifically, each pathway is made up of a series of individual indicators (*e.g*., indicators for Water Quality including Temperature, Sediment/Turbidity, and Chemical Contamination/Nutrients) that are measured or described directly (see, NMFS 1996b). Based on the measurement or description, each indicator is classified within a category of the properly functioning condition (PFC) framework: (1) *properly functioning*, (2) *at risk*, or (3) *not properly functioning*. Properly functioning condition is defined as "the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation."

2.1.2.2 Factors Affecting the Species at the Population (ESU) Level

In other Opinions, NOAA Fisheries assessed life history, habitat and hydrology, hatchery influence, and population trends in analyzing the effects of the underlying action on affected species at the population scale (see, for example, FCRPS, NMFS 2000). A thumbnail description of each of these factors for each ESU covered under this consultation is provided below.

2.1.2.2.1 Snake River Sockeye

Life History. In general, juvenile sockeye salmon rear in the lake environment for 1, 2, or 3 years before migrating to sea. Adults typically return to the natal lake system to spawn after spending 1, 2, 3, or 4 years in the ocean (Gustafson *et al.* 1997).

Habitat and Hydrology. In 1910, impassable Sunbeam Dam was constructed 20 miles downstream of Redfish Lake. Although several fish ladders and a diversion tunnel were installed during subsequent decades, it is unclear whether enough fish passed above the dam to sustain the run. The dam was partly removed in 1934, after which Redfish Lake runs partially rebounded. Evidence is mixed as to whether the restored runs constitute anadromous forms that managed to persist during the dam years, nonanadromous forms that became migratory, or fish that strayed in from outside the ESU.

Population Trends and Risks. NOAA Fisheries proposed an interim recovery level of 2,000 adult SR sockeye salmon in Redfish Lake and two other lakes in the Snake River Basin (Table 1.3-1 in NMFS (1995)). Low numbers of adult SR sockeye salmon preclude a Cumulative Risk Initiative (CRI)- or Quantitative Analysis of Risks (QAR)-type analysis of the status of this ESU (for more information, see http://www.nwfsc.noaa.gov/cri/index.html). However, because only 16 wild and 264 hatchery-produced adult sockeye returned to the Stanley Basin between 1990 and 2000, NOAA Fisheries considers the status of this ESU to be dire under any criteria. The risk of extinction is very high.

2.1.2.2.2 Snake River Fall Chinook

Life History. Fall chinook salmon in this ESU are ocean-type. Adults return to the Snake River at ages 2 through 5, with age 4 most common at spawning (Chapman *et al.* 1991). Spawning, which takes place in late fall, occurs in the mainstem and in the lower parts of major tributaries (NWPPC 1989; Bugert *et al.* 1990). Juvenile fall chinook salmon move seaward slowly as subyearlings, typically within several weeks of emergence (Chapman *et al.* 1991). Based on modeling by the Chinook Technical Committee, the Pacific Salmon Commission estimates that a significant proportion of SRF chinook (about 36%) are taken in Alaska and Canada, indicating a far-ranging ocean distribution. In recent years, only 19% were caught off Washington, Oregon, and California, with the balance (45%) taken in the Columbia River (Simmons 2000). Some SRF chinook historically migrated over 1,500 km from the ocean. Although the Snake River population is now restricted to habitat in the lower river, genes associated with the lengthier migration may still reside in the population. Because longer freshwater migrations in chinook salmon tend to be associated with more-extensive oceanic migrations (Healey 1983), maintaining populations occupying habitat that is well inland may be important in continuing diversity in the marine ecosystem as well.

Habitat and Hydrology. With hydrosystem development, the most productive areas of the Snake River Basin are now inaccessible or inundated. The upper reaches of the mainstem Snake River were the primary areas used by fall chinook salmon, with only limited spawning activity reported downstream from Oxbow Dam. The construction of Brownlee Dam (1958), Oxbow Dam (1961), and Hells Canyon Dam (1967) eliminated the primary production areas of SRF chinook salmon. There are now 12 dams on the mainstem Snake River, and they have substantially reduced the distribution and abundance of fall chinook salmon (Irving and Bjornn 1981).

Hatchery Influence. The Snake River system has contained hatchery-reared fall chinook salmon since 1981 (Busack 1991). The hatchery contribution to Snake River Basin escapement has been estimated at greater than 47% (Myers *et al.* 1998). Artificial propagation is recent, so cumulative genetic changes associated with it may be limited. Wild fish are incorporated into the brood stock each year, which should reduce divergence from the wild population. Release of subyearling fish may also help minimize the differences in mortality patterns between hatchery and wild populations that can lead to genetic change (Waples 1999; see NMFS (1999) for further discussion of the SRF chinook salmon supplementation program).

Population Trends and Risks. For the SRF chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[3] ranges from 0.94 to 0.86, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al.* 2000). NOAA Fisheries has also estimated the risk of absolute extinction for the aggregate SRF chinook salmon population, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end,

[3]Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.40 (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years is 1.00 (McClure *et al*. 2000).

2.1.2.2.3 Snake River Spring/Summer Chinook

Life History. In the Snake River, spring and summer chinook share key life history traits. Both are stream-type fish, with juveniles that migrate swiftly to sea as yearling smolts. Depending primarily on location within the basin (and not on run type), adults tend to return after either two or three years in the ocean. Both spawn and rear in small, high-elevation streams (Chapman *et al.* 1991), although where the two forms coexist, spring-run chinook spawn earlier and at higher elevations than summer-run chinook.

Habitat and Hydrology. Even before mainstem dams were built, habitat was lost or severely damaged in small tributaries by construction and operation of irrigation dams and diversions, inundation of spawning areas by impoundments, and siltation and pollution from sewage, farming, logging, and mining (Fulton 1968). Recently, the construction of hydroelectric and water storage dams without adequate provision for adult and juvenile passage in the upper Snake River has kept fish from all spawning areas upstream of Hells Canyon Dam.

Hatchery Influence. There is a long history of human efforts to enhance production of chinook salmon in the Snake River Basin through supplementation and stock transfers. The evidence is mixed as to whether these efforts have altered the genetic makeup of indigenous populations. Straying rates appear to be very low.

Population Trends and Risks. For the SRSS chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.96 to 0.80, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to the effectiveness of fish of wild origin (McClure *et al*. 2000). NOAA Fisheries has also estimated median population growth rates and the risk of absolute extinction for the seven spring/summer chinook salmon index stocks, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years for the wild component ranges from zero for Johnson Creek to 0.78 for the Imnaha River (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years ranges from zero for Johnson Creek to 1.00 for the wild component in the Imnaha River (McClure *et al*. 2000).

2.1.2.2.4 Snake River Basin Steelhead

Life History. Fish in this ESU are summer steelhead. They enter freshwater from June to October and spawn during the following March to May. Two groups are identified, based on migration timing, ocean-age, and adult size. A-run steelhead, thought to be predominately age-1-ocean, enter freshwater during June through August. B-run steelhead, thought to be age-2-

ocean, enter freshwater during August through October. B-run steelhead typically are 75 to 100 mm longer at the same age. Both groups usually smolt as 2- or 3-year-olds. All steelhead are iteroparous, capable of spawning more than once before death.

Habitat and Hydrology. Hydrosystem projects create substantial habitat blockages in this ESU; the major ones are the Hells Canyon Dam complex (mainstem Snake River) and Dworshak Dam (North Fork Clearwater River). Minor blockages are common throughout the region. Steelhead spawning areas have been degraded by overgrazing, as well as by historical gold dredging and sedimentation due to poor land management. Habitat in the Snake River Basin is warmer and drier and often more eroded than elsewhere in the Columbia River Basin or in coastal areas.

Hatchery Influence. Hatchery fish are widespread and stray to spawn naturally throughout the region. In the 1990s, an average of 86 percent of adult steelhead passing Lower Granite Dam were of hatchery origin. Hatchery contribution to naturally spawning populations varies, however, across the region. Hatchery fish dominate some stocks, but do not contribute to others.

Population Trends and Risks. For the SRB steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.91 to 0.70, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al*. 2000). NOAA Fisheries has also estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (McClure *et al*. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100 percent), the risk of absolute extinction within 100 years is 1.00 for both runs (McClure *et al*. 2000).

2.1.2.3 Factors Affecting the Species within the Action Area

Section 4(a)(1) of the ESA and NOAA Fisheries listing regulations (50 C.F.R. 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors; (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that will have some level of effects with short-term impacts from category (1) in the above paragraph, and the potential for long-term impacts as described in categories (3), (4), and (5). The characterization of these effects and a conclusion relating the effects to the continued existence of the listed Snake River ESU salmon and steelhead that are the subject of this consultation is provided below, in Section 2.1.3.

The major factors affecting SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead within the Action Area include hydroelectric facility operations and maintenance, and land use and shoreline development. NOAA Fisheries uses the MPI to analyze and describe the effects of these factors on listed salmon and steelhead. As described above, the MPI relates the biological requirements of listed species to a suite of habitat variables. In the analysis presented here, each factor is considered in terms of its effect on relevant pathways and associated indicators (*properly functioning, at risk, or not properly functioning*).

2.1.2.3.1 Hydroelectric Facilities

Hydropower development in the Snake River has profoundly altered the riverscape of the Action Area, which is located within the Lower Granite Dam pool (Lower Granite Lake). This dam and other similar structures have caused a broad range of habitat degradation, and altered the structure and function of the lower Snake River by converting a riverine environment to a series of reservoirs. Consequently, a host of indicators within numerous pathways of the MPI have been affected. Specifically, hydroelectric facility operations and maintenance have altered natural flow regimes, produced broad diel flow fluctuations, altered temperature profiles, inundated spawning habitat, created passage barriers, diminished sediment transport, eliminated lotic channel characteristics, altered riparian habitat, and expanded suitable habitat for piscivorous species (both native and exotic) that prey on or compete with salmonids.

Flow/Hydrology. Streamflow in the Snake River within the Action Area was historically driven by natural watershed processes, but is presently more significantly controlled by the operation of mainstem dams (*i.e.*, Little Goose and Lower Granite). In an unregulated condition, the Snake River in the Action Area would exhibit the hydrograph of a snowmelt-dominated system where discharge peaked in the spring concurrent with melting snow, and reached baseflow during the mid- to late-summer. Under these conditions, river ecosystems experienced a range of flows that served to promote floodplain riparian ecosystems, provide habitat for aquatic species assemblages, and protect vital ecosystem linkages and channel structure (Leopold *et al.* 1964; Ward and Stanford 1995a; 1995b; Fisher *et al.* 1998). Accordingly, aquatic biota have, over the eons, evolved life-history strategies that are spatially and temporally synchronized to seasonal runoff patterns (Groot *et al.* 1995; Stanford *et al.* 1996).

Presently, however, reservoir operations within the Action Area have attenuated and truncated the natural runoff regime, and produced a river system that is substantially out of phase with its unregulated, natural hydrograph. Further, hydropower peaking operations often cause broad daily flow fluctuations below dam facilities. Flow regimes that deviate from the natural condition are well understood to produce a diverse array of negative ecological consequences (Hill *et al.* 1991; Ligon *et al.* 1995; Richter *et al.* 1996; Stanford *et al.* 1996). The hydrograph of the Snake River within the Action Area is temporally and spatially discordant with its supporting watershed and, accordingly, the aquatic and riparian biota of the system have suffered. In the MPI analysis, streamflow falls under the Flow/Hydrology pathway, and Change in Peak/Base flow indicator. Presently, for the reasons described above, this indicator is *not properly functioning*. In this instance, *not properly functioning* is defined as "pronounced changes in peak flow, base flow and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography."

Water Quality. Water quality within the Action Area has been degraded by hydroelectric dams that contribute to high instream temperatures, high concentrations of dissolved atmospheric gases, and high concentrations of nutrients and pollutants bound to fine sediments that settle out in reservoir pools (Spence *et al.* 1996; NMFS 2000). Portions of the Action Area have been placed on the Washington State 303(d) list (Clean Water Act) for degraded temperature and total dissolved gas parameters (WDOE 1996; 1998). Based on this information, NOAA Fisheries concludes that relevant water quality indicators (Temperature, Sediment/Turbidity, and Chemical Contamination/Nutrients), and thus the Water Quality pathway of the MPI are *not properly functioning*.

Habitat Access. Hydroelectric dams control river stage and flow within the Action Area and can inhibit safe passage of listed salmonids by creating conditions where listed salmonids may be killed or injured by mechanical impingement or high dissolved gas levels (NMFS 1996, Spence *et al.* 1996; NMFS 2000). Additionally, the dams create false attraction to impassable areas, habitat for predators, and otherwise delay the progress of migrants. Therefore, based on the direct presence of hydroelectric dams and the secondary passage problems they cause, NOAA Fisheries concludes that the Habitat Access pathway (Physical Barriers indicator) of the MPI is *not properly functioning* within the Action Area because "manmade barriers present in the watershed prevent upstream and/or downstream fish passage at a range of flows."

Habitat Elements. Yet another consequence of reservoir impoundment for hydropower development is expressed as general habitat degradation within the Action Area. Habitat is a collective term that encompasses various physical, biological, and chemical interactions within a river and its watershed that produce the spatial and temporal environs in which riverine species exist. Numerous instream and floodplain elements of habitat (*e.g.*, substrate, large woody debris (LWD), pool frequency and quality, off-channel areas, and refugia) are vital to the production and maintenance of native fish assemblages (Everest *et al.* 1985; Bjornn and Reiser 1991; Karr 1991; Spence *et al.* 1996; NRCC 1996; NMFS 1996a).

When the Snake River was transformed into a series of slow moving reservoirs, much of the historic habitat was inundated and most habitat functions were lost (NMFS 2000). Sediment transport has been restricted to the extent that fine materials (silt, sand) settle out of the water column in the reservoirs instead of being flushed downstream (causing sedimentation) (NMFS 1996). In addition, low water velocity, the physical presence of the dams (both upstream and in the Action Area), and a management approach that maintains comparatively static reservoir pools act to trap spawning substrates, preventing downstream recruitment (NMFS 1996). Off-channel habitat, refugia (*i.e.,* remnant habitat that buffers populations against extinction (Sedell *et al.* 1990)), and large woody debris production areas have been reduced or entirely eliminated by reservoir inundation. Streamflow in the Action Area is highly regulated between dams, and channel-forming materials and processes are greatly diminished. This wholesale simplification of habitat has reduced or eliminated pools, riffles, and other instream habitat features that are vital to the foodweb and listed salmonids (Stanford *et al.* 1996). These factors have impaired every indicator (*e.g.*, Substrate, LWD, Pool Frequency and Quality, Off-channel Habitat, and Refugia) of the Habitat Elements pathway such that all are *not properly functioning* within the Action Area.

Channel Condition and Dynamics. Large reservoirs are often the defining hydrologic feature in arid environments such as the Action Area, and their operational regimes often alter mainstem rivers both upstream and downstream of dam structures, as well as streams tributary to a reservoir pool (Collier *et al.* 1996). Reservoir structural elements and management scenarios force tributaries to equilibrate to new base levels by aggradation or incision, and these mechanisms often cascade throughout each tributary subwatershed (Lane 1955; Williams and Wolman 1984; Montgomery and Buffington 1998; Shields *et al.* 1995, 2000). Gravels trapped behind a dam are no longer available to downstream reaches for bank and bed formation/maintenance, and can limit substratum for spawning salmonids and other members of the riverine food web (Moreau 1984; Ramey *et al.* 1987; Ligon *et al.* 1995; Ward and Stanford 1995b). The availability and cycling of sediment along the river continuum has a controlling influence on channel morphology, floodplain and channel complexity, and riparian species assemblages (Leopold *et al.* 1964; Williams and Wolman 1984; Dunne and Leopold 1978; Vannote *et al.* 1980; Gregory *et al.* 1991; Ligon *et al.* 1995). In addition, altered flow regimes (from an unregulated condition) can impact hydraulic parameters with associated biologic components (*i.e.*, sediment transport, gravel recruitment, and bank stability and morphology) that are important to riverine aquatic species (O'Brien 1984, Williams and Wolman 1984; Waters 1995; Ligon *et al.* 1995). Finally, periodic flooding redeposits silts, provides passage for biota to and from floodplain habitats, leads to extensive nutrient transformations, promotes channel maintenance, facilitates floodplain storage and enhances floodplain biodiversity and production (Bayley 1991; Junk *et al.* 1989; Sedell *et al.* 1989; Power *et al.* 1995).

The Snake River throughout the Action Area presently bears little resemblance to the riverine environment that existed previous to hydrosystem development. The floodplain and mainstem channel of the Snake River is buried under many feet of reservoir water, and tributary junctions are affected by inundation and pool fluctuation as well. Thus, riverine processes and their ecological linkages important to listed salmonids and the aquatic environment such as those described in the preceding paragraph are greatly diminished if not totally absent. Consequently, all requisite indicators of the Channel Condition and Dynamics pathway (*e.g.*, Width/Depth Ratio, Streambank Condition, and Floodplain Connectivity) are *not properly functioning* in the Action Area; the historic channel of the Snake River no longer exists save for short tailwater reaches below the dams.

2.1.2.3.2 Land Use and Shoreline Development

In the Action Area of this project, numerous anthropogenic features and/or activities (*e.g.,* dams, marinas, docks, residential dwellings, roads, railroads, rip-rap, and landscaping) have become permanent fixtures on the landscape and have displaced and altered native riparian habitat to some degree. Consequently, the potential for normal riparian processes (*e.g.*, shading, bank stabilization and LWD recruitment) to occur is diminished, and aquatic habitat has become simplified (Ralph *et al.* 1994; Young *et al.* 1994; Fausch *et al.* 1994; Dykaar and Wigington 2000).

Shoreline development has reduced the quality of nearshore salmonid habitat by eliminating native riparian vegetation, displacing shallow water habitat with fill materials, and by further disconnecting the Snake River from historic floodplain areas. Further, riparian species that evolved under the environmental gradients of riverine ecosystems are not well suited to the present hydraulic setting of the Action Area (*i.e.*, static, slackwater pools), and are thus often replaced by nonnative, exotic species (Rood and Mahoney 1990; Scott *et al.* 1996; Rood and Mahoney 2000; Braatne and Jamieson 2001). Therefore, the Watershed Conditions pathway and Riparian Reserves indicator *is not properly functioning* in the Action Area because "the riparian reserve system is fragmented, poorly connected, and provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact)."

2.1.2.4 Environmental Baseline

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action would be added. The term "environmental baseline" means "the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process " (50 C.F.R. 402.02). As described above in Section 1.4, the Action Area includes the reach of the Snake River impounded by Lower Granite Dam (Lower Granite Lake).

The headwaters of the Snake River emerge from the Grand Teton Mountains in western Wyoming and flow for 1,040 miles where they converge with the Columbia River in southeastern Washington State. Anadromous fish are only able to ascend the mainstem Snake River up to Hells Canyon Dam, located along the Oregon/Idaho border. Below its confluence with the Clearwater River near the mouth of Hells Canyon, the Lower Snake River consists of a series of four reservoirs, each approximately 36 miles in length, that extend from Lewiston, Idaho at Snake River mile 139 to Pasco, Washington at the confluence of the Snake and Columbia Rivers. These facilities (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams), were constructed by the COE between 1955 and 1975 to provide slackwater shipping, produce hydroelectric power, and supply water for irrigated agriculture.

The Snake River Basin traverses a number of physiographic provinces and ecoregions along its seaward migration, and thus climate, topography, precipitation, and vegetative cover are highly variable (Omernik 1987). This variable physical setting produces a range of aquatic and terrestrial habitats ranging from high mountain meadows with perennial streams to lowland desert scrublands with ephemeral torrents. With respect to anadromous fishery resources, the Snake River Basin once supported abundant and diverse runs of salmon and steelhead that now return in just a fraction of their historic numbers (Nehlsen *et al.* 1991; Busby *et al.* 1996; NMFS 1996a; 1998; 2000).

Within the Action Area, the Snake River resides in a canyon of Miocene-aged Columbia River Flood basalts. The area receives around 17 inches of precipitation per year, and supports few perennial streams. Upland vegetation ranges from scrub-shrub species to sparse conifer stands, and in areas where loess soils are thick enough and water available, row crops such as potatoes and wheat dominate (Williamson *et al.* 1998). The Action Area contains backflood deposits from the Missoula Floods (Bretz 1969), and also conveyed the Bonneville Flood (Malde 1968; O'Connor 1993) westward to the prehistoric Pacific Ocean. Consequently, flood deposits, old river terraces, and other depositional areas above adjacent reservoir pool levels are used for borrow and gravel pits. Other major land uses in the Action Area include rangeland grazing and recreation.

Water quality in the Action Area is generally poor. Hydroelectric facilities, agricultural runoff, and lack of riparian vegetation contribute to high temperatures, dissolved nutrients and pesticides, altered streamflow regimes, and fine sediment influx. The toxicity of these water quality constituents can be made more chronic by large impoundments with relatively minor volumetric turnover and high temperatures throughout the summer as natural inflow decreases.

Endangered SR sockeye and threatened SRF chinook, SRSS chinook, and SRB steelhead are currently affected by a number of habitat modifications within the Action Area. The most prominent and deleterious modifications are the result of hydroelectric facilities and the general transformation of the landscape, both aquatic and terrestrial, that these dams have produced. Specifically, hydropower dams have inundated riverine and floodplain habitats, transformed a riverscape into a series of slackwater reservoirs, altered water chemistry and sediment transport dynamics, truncated natural runoff patterns, restricted habitat access, and altered aquatic species assemblages.

The impoundment of the Snake River in the Action Area has removed riverscape attributes vital to the survival and recovery of listed salmonids. Riverine structure and function are determined by the changing temporal interaction of the physical, chemical, and biological components of a river, along three physical dimensions: longitudinal (headwaters to downstream), vertical (water circulation into bed sediments of the channel and floodplain), and horizontal (water circulation onto and from floodplains) (Hynes 1983; Ward and Stanford 1995b). Floodplains, their riparian wetlands, and interconnected mosaics of aquatic and semi-aquatic habitats are integral components of rivers (Stanford and Gonser 1998), and the species that depend upon them for survival (Minshall *et al.* 1985; Stanford *et al.* 1996). Disconnecting river channels from their floodplain habitats by flow regulation, impoundment, and/or revetment can compromise the ecological integrity of riverine ecosystems (Sedell *et al.* 1990; Stanford and Hauer 1992; Ward and Stanford 1995a). Altering the runoff regime or channel hydraulics under which streams developed can produce channel forms that are dissimilar to the natural condition (Leopold *et al.* 1964), which can have corresponding detrimental effects to the organisms that coevolved within the same river system (Vannote *et al.* 1980; Wallace *et al.* 1982; Minshall *et al.* 1983). The impact of hydropower development within the Action Area has virtually erased the physical habitat template of a riverine ecosystem, and the native aquatic community has suffered accordingly.

Sedimentation, turbidity, and nutrient enrichment can directly affect salmonids, and alter the structure and function of the environment in which they live. Concurrent with physical changes, indirect biological transformation has also occurred within the Action Area. Oftentimes, nonnative species are better suited to thrive in impacted systems (Stanford 1994), and altered physical habitats can help expand the niche of native predators resulting in increased populations and predation success. Exotic species that prey on salmonids, including percids and centrarchids, have become established in the Snake River (Wydoski and Whitney 1979). These predators may feed directly on salmonids (Tabor *et al.* 1993) or compete for other food or habitat resources. McMichael *et al.* (1998) postulated that increased water temperature, turbid summer water conditions, and elevated digestive capabilities afforded by degraded water quality in the lower Yakima River, WA resulted in increased predation rates by piscine predators (both native and exotic) on outmigrating salmon and steelhead. Other native predators, including pikeminnow (*Ptychocheilus oregonensis),* have exploited the impounded environment created by dams, although their predation rates are higher in the lower Columbia River (Faler *et al.* 1988).

A number of general anthropogenic development factors have also influenced listed species. Along the shores of the Snake River throughout the Action Area, agriculture, transportation infrastructure, and commercial and residential development have displaced riparian and shallow water habitat used by juvenile salmonids. This development also contributes some quantity of runoff and pollution, which may include sediments, fertilizer, pesticides, and petroleum products. Additionally, these activities have degraded riparian habitat by direct canopy removal, covering the ground with materials that preclude plant growth, reducing the widths of riparian zones, and altering riparian species composition in favor of exotic plants. Degraded riparian zones contribute an inadequate amount of LWD, and marina and private dock developments have fostered habitats where piscine predators are more successful.

Based on the above information, NOAA Fisheries concludes that not all of the biological requirements of listed salmon and steelhead for freshwater habitat in general are being met under the environmental baseline in this watershed. The status of the species is such that there must be significant improvement in the environmental conditions they experience over those presently available under the environmental baseline to meet the biological requirements for survival and recovery of this species. Further degradation of these conditions could significantly reduce the likelihood of survival and recovery of this species because of the amount of risk listed salmon and steelhead already face under the current environmental baseline.

2.1.3 Effects of the Proposed Action

NOAA Fisheries' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or Critical Habitat (excluding SRB steelhead) together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur (50 C.F.R. 402.02).

2.1.3.1 Direct Effects

Direct effects result from the agency action and may include the effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. The direct effects resulting from the proposed Port of Clarkston Gateway Dock expansion project include (1) possible increase in turbidity pursuant to construction activities, and (2) noise effects from pile driving.

2.1.3.1.1 Turbidity

Construction equipment activities (*i.e.*, work-barge spuds and tow boat prop-wash), pile driving, and other activities associated with the installation of driven steel piles in the Snake River will mobilize sediments and temporarily increase downstream turbidity levels. In the immediate vicinity of the construction activities (several hundred feet), the level of turbidity will likely exceed natural background levels and potentially affect listed SRF chinook and SRB steelhead.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (*i.e.*, gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

When the particles causing turbidity settle out of the water column, they contribute to sediment on the riverbed (sedimentation). When sedimentation occurs, salmonids may be negatively affected: (1) buried salmonid eggs may be smothered and suffocated, (2) prey habitat may be displaced, and (3) future spawning habitat may be displaced (Spence *et al.* 1996). Additionally, turbidity and subsequent sedimentation can affect the quality of stream substratum as spawning material, influence the exchange of streamflow and shallow alluvial groundwater, occupy channel storage areas for cobbles and gravels, increase width-depth ratios, depress riverine productivity, and contribute to decreased salmonid growth rates (Waters 1995; Newcombe and Jensen 1996; Shaw and Richardson 2001).

The Port of Clarkston dock expansion project will cause elevated turbidity levels during the instream construction period and for several days afterwards. The initial placement of the work barge by tow boats and pile placement and driving will cause a temporary turbidity spike above background levels only moderate in magnitude. However, the effects of this turbidity on listed fish will be minimized by: (1) ensuring that no construction equipment will touch or be connected to the bank of the Snake River; and, (2) performing in-water construction activities during the prescribed work window (December 15th through March 1st). It is expected that listed fish present during the initial phases of construction will temporarily move to refuges where turbidity can be avoided, thus preventing injury or death. Additionally, restricting in-water operations to this time period minimizes the potential for adverse effects to listed sockeye, chinook, and steelhead juveniles because they are least likely to be present in the Action Area during this work-window. Some adult SRB steelhead may be in the Action Area at the time of construction, but should vacate the area once activities are undertaken. Installing 35 driven steel pilings into the Snake River at the Port of Clarkston should have no long-term effects on turbidity and sedimentation rates in the future.

It is expected that turbidity and sedimentation caused by this action will be short lived, returning to baseline levels soon after construction is over, and long term impacts (*i.e.*, adverse modification of SR sockeye, SRF chinook, and SRSS chinook Critical Habitat) will not occur. Other than the short term inputs mentioned above, this project will not change or add to the existing baseline turbidity or sedimentation levels within the Action Area.

2.1.3.1.2 Pile Driving

Pile driving is known to produce sound pressure levels which may harm fishes, and this harm can vary from disruption of normal behavior patterns to physical injury and death. The type of harm inflicted depends on the type and intensity of the sounds produced, which, in turn, depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water and the type and size of the pile-driver. When driving steel piles, vibratory pile drivers produce a sound with a repetition rate of approximately 20-30 Hz, which is in the infrasound range. Such sounds are similar to those that have been shown to elicit an avoidance response in fishes (Enger et al. 1992; Sonalysts, Inc. 1997; Knudsen et al. 1997; Sand et al. 2000; Carlson et al. 2001). At infrasound frequencies, fishes respond to the particle acceleration of the pressure wave (at a threshold of level of 0.01 m/s2), that the fish must be close to the source of the sound (within 1 wavelength), and the fish must be exposed to the sound for several seconds (Enger et al. 1992; Knudsen et al. 1994; Sand et al. 2000). Carlson (2001) estimated that for 9-inch diameter steel pile, the avoidance threshold for particle acceleration would not be exceeded beyond 20-30 ft from the pile. Therefore, within a limited area around the pile, avoidance of vibratory pile-driving activity by juvenile salmonids may disrupt normal behavior patterns such as feeding and downstream migration.

Excessively high sound pressure levels can injure, or kill, fishes, and are a cause for concern during pile driving activity. A number of recently reported fish-kills associated with pile driving in the Pacific Northwest have contributed to the growing body of evidence that this activity can harm fishes (e.g., FRDP, Ltd. 2001; Washington State Ferries 2001; NOAA Fisheries 2002; Stadler, pers. comm. 2002). However, all of these reported kills have occurred when an impact hammer, and not a vibratory hammer, was being used. The injuries and death associated with impact hammers are likely due to the intense, sharp spike of sound produced when the hammer strikes the pile. As their name implies, vibratory hammers use vibration instead of impact to drive the piles, producing sounds that are less intense and less sharp than those produced by impact hammers (Stadler, pers. com. 2002). Since the harmful effects from vibratory hammers have not been studied, it is uncertain what, if any, these effects are, but it is likely that vibratory hammers pose less of a threat of physical harm than do impact hammers.

Research and field observations show that effects associated with pile driving can range from disruption of schooling behavior to fish death. Deleterious effects to listed salmonids in the Action Area would be minimized because the project proponent is using a vibratory pile driver. In addition, in-water operations will only occur between December 15th and March 1st in the year(s) during which the project receives permit(s). Restricting in-water operations to this time period minimizes the potential for adverse effects to listed sockeye, chinook, and steelhead because adults and juveniles are least likely to be present in the Action Area during this work-window.

2.1.3.2 Indirect Effects

Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. 402.02). Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action. The indirect effects resulting from the proposed Port of Clarkston dock expansion project are centered on added predation risks and increased predator populations attributable to the introduction of new inwater structure.

2.1.3.2.1 Increased Predation and Predator Populations

Predation on listed salmonids is expected to increase as a result of the Port of Clarkston dock expansion project. Native (*e.g.*, northern pikeminnow) and exotic (*e.g.*, smallmouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), and yellow perch (*Perca flavescens*)) piscine predators are year-round residents of the Lower Granite Lake and are also known to consume listed salmon and steelhead (Bennett *et al.* 1983; LSSS 2001). Increased predation impacts are a function of increased predation rates on listed salmonids, as well as increased predator populations from introduced artificial habitat that imparts rearing and ambush habitat for native and exotic predator species.

Four major predatory strategies are utilized by piscivorous fish: prey pursuit; prey ambush; prey habituation to a non-aggressive illusion; or prey stalking (Hobson 1979). Ambush predation is probably the most commonly employed predation strategy. Predators lie-in-wait, then dart out at prey in an explosive rush (Gerking 1994). Oftentimes, predators use sheltered areas that provide velocity shadows to ambush prey fish in faster currents (Bell 1991). The addition of four 16" plumb piles and thirty-one 14" batter piles to the Action Area will provide a total of approximately 581 square feet (in 14 feet of water) of vertical and near vertical current blockage that will impart velocity shadows of unknown size that expand and contract as discharge changes. These velocity shadow areas will likely be used by resting salmonids as well as ambush predators waiting to capture them.

Additionally, light plays an important role in both predation success and prey defense mechanisms. Prey species are better able to see predators under high light intensity, thus providing the prey species with a relative advantage (Hobson 1979). Petersen and Gadomski (1994) found that predator success was higher at lower light intensities. Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994). Howick and O'Brien (1983) found that under high light intensities, prey species (bluegill (*Lepomis macrochirus*)) can locate largemouth bass (*Micropterus dolomieu*) before they are seen by the bass. However, under low light intensities, bass can locate the prey before they are seen. Walters *et al.* (1991) indicate that high light intensities may result in increased use of shade-producing structures by predators, while Bell (1991) states that "light and shadow paths are utilized by predators advantageously."

In/over-water structures create light/dark interface conditions (*i.e.,* shadows) that allow ambush predators to remain in darkened areas (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Prey species moving around structure(s) are unable to see predators in dark areas under or beside structure(s) and are more susceptible to predation. Juvenile salmonids, especially ocean type chinook (among others), may utilize backwater areas during their outmigration (Parente and Smith 1981). The presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior, and depressing growth (Dunsmoor *et al.* 1991). Bevelhimer (1996), in studies on smallmouth bass, indicates that ambush cover and low light intensities create a predation advantage for predators and can also increase foraging efficiency. Ward (1992) found that stomachs of pikeminnow in developed areas of Portland Harbor contained 30 percent more salmonids than those in undeveloped areas, although undeveloped areas contained more pikeminnows.

Literature as well as anecdotal evidence substantiates the use of docks and other structures by juvenile predators for rearing purposes in the Snake River system. Juvenile predators may derive a survival advantage from use of these structures by avoiding predation by their larger conspecifics (Hoff 1991; Carrasquero 2001). Additionally, smallmouth bass have been observed to preferentially locate nest sites near artificial structures (Pflug and Pauley 1984; Hoff 1991). Hoff (1991) documents increases of successful smallmouth bass nests of 183 percent to 443 percent and increases in catch/effort for fingerlings of 607 percent to 3,840 percent in Wisconsin lakes after the installation of half-log structures, concluding that increasing nesting cover in lakes with low nest densities, poor quality and/or quantity of nesting cover, and low first-year recruitment rates can significantly increase recruitment. The proposed action is likely to increase rearing and spawning habitat for predators, which may improve spawning success and lead to an overall population increase.

Native predators such as northern pikeminnow, and introduced predators such as smallmouth bass, black crappie, white crappie, and potentially, yellow perch (Ward *et al.* 1994, Poe *et al.* 1991, Beamesderfer and Rieman 1991, Rieman and Beamesderfer 1991, Petersen *et al.* 1990, Pflug and Pauley 1984, and Collis *et al.* 1995) likely utilize habitat created by in/over-water structures (Ward and Nigro 1992, Pflug and Pauley 1984) such as the 35 pilings and floating overwater structures proposed under this consultation. The proposed action will add both ambush and shadow areas for piscine predators. Juvenile and young-of-the-year (YOY) SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead use the Action Area for migratory purposes, and some individuals may actually rear throughout the area. The extent of increase in predation on salmonids in the Snake River resulting from over-water structures is not well known, however, NMFS (1995) states that there should be no programs that improve habitat, production or survival of introduced species' and that "recruitment of these species into habitats of the listed species should be curtailed" to allow for the recovery of listed ESUs. Further, salmon stocks with already low abundance are susceptible to further depression by predation (Larkin 1979).

Based on the presence of young salmonids and native and exotic predators in the Action Area, and the additional shading and vertical structure created by the installation of 35 new pilings and additional floats to the Port of Clarkston dock, it appears likely that the proposed action will contribute to increased predation rates on listed juvenile and young of the year salmonids. Further, these pilings will create spawning and rearing habitats that could increase predator populations. The extent to which the Port of Clarkston dock expansion project will benefit predaceous fish cannot be estimated. However, when added to the environmental baseline, the advantageous predator habitat created by piling installation and overwater structures to the Action Area will likely result in only a minor increase in predation rates on listed salmonids. Thus, NOAA fisheries expects that the risk of predation to increase.

2.1.3.3 Effects on the Population Level

As detailed in Section 2.1.2.2, NOAA Fisheries has estimated the median population growth rate (lambda) for each species potentially affected by the Port of Clarkston dock expansion project. Under the environmental baseline, life history diversity has been limited by the influence of hatchery fish, by physical barriers that prevent migration to historical spawning and/or rearing areas, and by water temperature barriers that influence the timing of emergence, juvenile growth rates, or the timing of upstream or downstream migration. Additionally, hydropower development has profoundly altered the riverine environment and those habitats vital to the survival and recovery of the ESUs that are the subject of this consultation.

The Port of Clarkston dock expansion project is expected to add temporary, construction-related detrimental effects to the existing environmental baseline. Further, NOAA Fisheries believes that long-term, nearly insignificant increases in predation rates and predator populations will occur as well. However, these effects, as detailed above, are not expected to have any significance on the affected populations of listed salmonids. Therefore, NOAA Fisheries believes that the proposed action does not contain measures that are likely to adversely affect the population trends, habitat and hydrology, life-history diversity, or the influence of hatcheries on the ESU compared to conditions under the environmental baseline.

2.1.3.4 Effects on Critical Habitat

NOAA Fisheries designates Critical Habitat for a listed species based upon physical and biological features that are essential to that species. Essential features of Critical Habitat for SR Sockeye, SRF chinook, and SRSS chinook include substrate, water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (58 Fed. Reg. 68543, December 28, 1993). Critical Habitat is not currently designated for the SRB steelhead ESU (see footnote 2).

The direct and indirect effects previously discussed include effects on Critical Habitat, to a limited extent. The avenues in which Critical Habitat may be affected are apparent in the MPI analysis: specifically, in the Water Quality, Habitat Access, Habitat Elements, Channel Condition and Dynamics, Flow/Hydrology, and Watershed Conditions pathways. Within these pathways, and when considering the action under consultation in comparison to the environmental baseline, the functional quality of most indicators will be maintained. However, pile driving activities will briefly degrade indicators in the Water Quality pathway (*i.e.,* Sediment/Turbidity) by creating turbid water within the Action Area. Relating this indicator back to essential habitat elements, the primary impact of this action will be a short-term decline in water quality and substrate conditions.

The long-term effects of the project are likely to impact safe passage conditions for listed fish, to some degree. Based on the best available scientific data, NOAA Fisheries believes that installing overwater structures and 35 new pilings will improve predation and rearing conditions for both native and exotic piscivorous fish, and could contribute to at least a localized increase in predator populations. Migrating juvenile listed fish may be inclined to seek refuge in the velocity shadow of these new pilings, and may then fall prey to predators. However, when added to the environmental baseline, it appears that the proposed action is unlikely to appreciably diminish the value of this element of Critical Habitat. When the short- and long-term effects of the proposed action are taken as a whole, it appears unlikely that the Port of Clarkston dock expansion project will adversely modify SR Sockeye, SRF chinook, and SRSS chinook Critical Habitat.

2.1.4 Cumulative Effects

Cumulative Effects are defined in 50 C.F.R. 402.02 as “those effects of future state or private activities, not Federal activities, that are reasonably certain to occur within the Action Area of the Federal action subject to consultation.” For this analysis, cumulative effects for the general Action Area are considered. Future Federal actions, including the ongoing operation of hatcheries, irrigation projects, fisheries, and land management activities have been or will be reviewed through separate section 7 consultation processes.

It is expected that a range of non-Federal activities would occur within the Snake River Basin for the purposes of restoring and enhancing fish habitat. These activities would likely include installing fish screens, improving flow management and irrigation efficiency, restoring instream and riparian habitat, and removing barriers to passage. Although the specific details of individual projects are lacking, it is assumed that non-Federal conservation efforts would continue or increase in the near future.

The State of Washington has also implemented a number of strategies to improve habitat for listed species. The 1998 Salmon Recovery Planning Act provided the framework and a funding mechanism for developing watershed restoration projects. It also created the Governor’s Salmon Recovery Office to coordinate and assist in the development of salmon recovery plans. Washington’s “Statewide Strategy to Recover Salmon,” for example, is designed to improve watersheds (NMFS 2000).

The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. Grants are made available to conduct assessments of water resources and to develop goals and objectives for future water resources management. The Salmon Recovery Funding Act established a board to localize salmon funding. The board will deliver funds for salmon recovery projects and activities (NMFS 2000).

Washington State Department of Fish and Wildlife (WDFW) and tribal co-managers have been implementing the Wild Stock Recovery Initiative since 1992. The co-managers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The plans also concentrate on actions in the harvest and hatchery areas, including comprehensive hatchery planning. The department and some western Washington treaty Tribes have also adopted a wild salmonid policy to provide general guidance to managers on fish harvest, hatchery operations, and habitat protection and restoration measures to better protect wild salmon runs (NMFS 2000). Water quality improvements may result from the development of total maximum daily load restrictions (TMDL) for a range of pollutants. The state of Washington is under court orders to develop TMDL management plans for each water body listed as water quality limited under Section 303(d) of the Clean Water Act. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development (NMFS 2000).

In addition to potential beneficial projects, it is also likely that much of the private land management and water regulation will continue under existing conditions. Specific activities such as farming in or adjacent to sensitive riparian areas, allowing livestock to access Critical Habitat, and the management of exotic predators as game species in hydropower reservoir pools will continue to adversely affect listed SR Sockeye, SRF chinook, and SRSS chinook, and SRB steelhead.

2.1.5 Conclusion/Opinion

NOAA Fisheries' jeopardy analysis is based upon the current status of the species, the environmental baseline for the Action Area, and the effects of the proposed action. The analysis takes into account the species' status because determining the impact upon a species' status is the essence of the jeopardy determination. Depending upon the specific considerations of the analysis, actions that are found likely to impair currently properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat towards PFC at the population or ESU scale will generally be determined likely to jeopardize the continued existence of listed salmon, adversely modify their Critical Habitat (excluding SRB steelhead), or both. Specific considerations include whether habitat condition was an important factor for decline in the listing decision, changes in population or habitat conditions since listing, and any new information that has become available (NMFS 1999).

NOAA Fisheries has determined that the effects of the proposed action will not jeopardize the continued existence of the SR sockeye, SRF chinook, SRSS chinook, or SRB steelhead ESUs, or result in the adverse modification or destruction of SR sockeye, SRF chinook, or SRSS chinook Critical Habitat. The determination of no jeopardy is based upon the current status of the species, the environmental baseline for the Action Area, and the effects of the proposed action.

The instream construction elements of the Port of Clarkston dock expansion project will create short term direct effects with a more than negligible chance of causing incidental take. SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead either migrate through or rear in the Action Area. Therefore, the most significant risks are posed by (1) the temporary increase in turbidity that will occur during equipment positioning, stabilization, and pile driving activities, and (2) sound levels that elicit an avoidance response from pile driving operations. The risk of take will be minimized by the implementation of conservation measures and construction timing restrictions as set forth in this Opinion. At no time, and without contingencies, will the activities described in this Opinion have levels of take or destroy habitat that would appreciably reduce the likelihood of survival and recovery of listed species that are the subject of this consultation.

2.1.6 Reinitiation of Consultation

Consultation must be reinitiated if (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; or (3) a new species is listed or Critical Habitat is designated that may be affected by the action (50 C.F.R. 402.16). NOAA Fisheries will be monitoring the listed reasonable and prudent measures and terms and conditions of the incidental take statement. NOAA Fisheries may reinitiate consultation if the above measures are not adequately completed, resulting in increased probability of take to listed species. To reinitiate consultation, the COE must contact the Habitat Conservation Division (Washington Branch Office) of NOAA Fisheries.

2.2 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to Section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct (50 C.F.R. 217.12). Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by “significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering” (50 C.F.R. 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or applicant carrying out an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and is not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary; for the exemption in Section 7(o)(2) to apply, they must be implemented by the action agency so that they become binding conditions of any grant or permit issued to the applicant as appropriate. The COE has a continuing duty to regulate the activity covered in this incidental take statement. If the COE fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. The take statement also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of Take Anticipated

As stated in Section 2.1.1, above, listed salmon and steelhead use the Action Area for migratory purposes and possibly rearing. Also, as detailed in NMFS (2000) it is possible to encounter SR sockeye, SRF chinook, SRSS chinook, and/or SRB steelhead in the Action Area any day of the year. Therefore, take of these listed fish is reasonably certain to occur incidental to the proposed action. The proposed action includes measures to reduce the likelihood of incidental take. For any residual take, the following reasonable and prudent measures and terms and conditions are required to minimize the take. NOAA Fisheries has determined that the proposed action will add approximately 581 cubic feet of inwater structure, 100 square feet of overwater structure, and remove about 41.5 square feet of benthic habitat from the Action Area. Despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate the number of fish that would be injured or killed by these occurrences. However, the spatial extent of these environmental changes is a habitat surrogate for estimating the amount of take. As such, these spatial estimates represent the limits on incidental take that will be authorized through this Incidental Take Statement. Therefore, should any one of these limits be exceeded during the construction of the project, work must stop and the COE must reinitiate consultation. For a more detailed discussion of the mechanisms by which take could occur, the reader is encouraged to refer to Section 2.1.3.1 of this Opinion.

NOAA Fisheries believes that the action, as described, is reasonably certain to result in incidental take of listed salmonids from (1) detrimental effects of increased turbidity arising from positioning equipment, stabilizing barges, and driving piles, (2) detrimental effects from increased sound levels resulting from vibratory-driven steel piles, (3) increased predation by piscivorus fish as an indirect result of the addition of in- and over-water structures, and (4) disruption of migration behavior of SRF chinook resulting from in-water structures. The possible take through detrimental effects of turbidity and sound are being minimized by the defined work window (December 15th to March 1st) when the risk of any take is the lowest. The addition of in- and over-water structures will result in an increase in predation or salmonids that would be difficult to detect. NOAA Fisheries cannot quantify the behavioral disruption to SRF chinook, however lethal take is not expected to occur. Finally, if the COE or the project proponent observe any dead or injured fish at the project site, construction will immediately cease and NOAA Fisheries will be contacted for further guidance.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimizing take of SR sockeye, SRF chinook, SRSS chinook, and SRB steelhead. These RPMs are integrated into the BA and proposed project, and NOAA Fisheries has included them here to provide further detail as to their implementation.

1. The COE will minimize take by incorporating best management practices (BMPs) to reduce potential impacts of construction staging activities.

2. The COE will minimize take by incorporating BMPs to reduce potential impacts of instream construction activities.

3. The COE will minimize take by incorporating appropriate timing restrictions.

2.2.3 Terms and Conditions

To comply with ESA Section 7 and be exempt from the prohibitions of Section 9 of the ESA, the COE must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. Implement RPM No.1 by conducting the following:

    1.1 A spill prevention, control, and containment (SPCC) plan will be implemented.

    1.2 Hydraulic fluid in heavy equipment will be replaced with mineral oil or other biodegradable, non-toxic hydraulic fluid.

    1.3 All heavy equipment will be clean and free of external oil, fuel, or other potential pollutants.

2. Implement RPM No.2 by conducting the following:

    2.1 Prior to instream construction, any large equipment intended for instream use will be steam cleaned and free of external petroleum-based products.

    2.2 No more than four 16" plumb piles and thirty-one 14" batter piles will be installed to stabilize the Port of Clarkston dock.

3. Implement RPM No.3 by conducting the following:

    3.1 Inwater construction will only occur between December 15th and March 1st of any year all funding, equipment, and permit requirements are in place.

2.2.4 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or Critical Habitat, to help implement recovery plans, or to develop additional information.

NOAA Fisheries encourages the COE to more fully assess the long-term impacts that in/over-water structure construction and maintenance may have on anadromous salmonids throughout the Snake and Columbia River systems. This assessment should include long-term projections for the number of docks that the COE intends to permit in the Action Area, an estimate of the cumulative impact of these docks and their indirect effects on salmonid populations, and the ability of these populations to survive and recover while so impacted.

Additionally, NOAA Fisheries encourages the COE to work with applicants seeking permits for the construction and/or maintenance of in/over-water structures to ensure that future proposed actions result in little or no net increase in total in/over-water structure. This goal may be attained by a combination of minimizing the size and/or number of proposed structural elements (especially piles), and identifying existing structures that can be removed, modified, or consolidated. Further, NOAA Fisheries encourages the COE to explore avenues to improve salmonid habitat and ecosystem function in the Action Area to compensate for habitat impacts associated with docks and boating activity.

NOAA Fisheries must be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or their habitat. Accordingly, NOAA Fisheries requests notification of the implementation of any conservation recommendations.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH (§305(b)(4)(A));

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 C.F.R. 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 C.F.R. 600.810).

Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies regarding any activity that may adversely affect EFH, regardless of its location.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse impacts to EFH resulting from the proposed action.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999; see: http://www.pcouncil.org/salmon/salother/a14.html). Assessment of the impacts to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and Action Areas are detailed above in Sections 1.3 and 1.4 of this document. The Action Area contains habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Actions

As described in detail in Section 2.1.3 of this document, the proposed activities may result in detrimental short and long-term impacts to a variety of habitat parameters. These adverse effects are:

1. Short-term degradation of water quality (turbidity and contamination from accidental spills and/or leaks) because of instream construction activities.

2. Long-term increase in predation on coho and chinook, as well as long-term increase in freshwater exogenous material (exotic predators).

3.5 Conclusion

NOAA Fisheries believes that the proposed action may adversely affect designated EFH for chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. NOAA Fisheries believes that the increases in predation are already minimized, to the maximum extent practicable, by the conservation measures described in the BA and therefore has no additional conservation recommendations. To minimize the remaining adverse effects to designated EFH for Pacific salmon (suspended sediment and contamination of waters), NOAA Fisheries recommends that the COE adopt Terms and Conditions 1, 2, and 3 as described in Section 2.2.3 of this document.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 C.F.R. 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 C.F.R. 600.920(k)).

4.0 REFERENCES

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